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 The current investigation is devoted to the main questions of the creep of the cementsoil. The object of exploration is clayey bottom soils, which is the main element of the cementsoils, taken from the territories of Araq town of Eiqabad region of Islamic Republic of Iran. The soils of different ages - 7, 21, 28, and 60 days old and with 1.68 , 1.60 , 1.55 , 1.50 g/cm<sup>3</sup> density of soil skeleton, mixture of 93 % of soil and 7% of cement were tested on temporary compressive strength and on parameters of creep. During the test were taken into consideration the role of deformations of shrinkage in the compressive deformations. The creep deformation is taken as the differences between the full deformation and deformation of shrinkage. At the same stress increase of the age initiate decrease of creep deformations because of the rise of the strength during the time at cementsoils of different ages. As a result of the current investigation it has been established that cementsoils of the same age under the conditions of equal relative compressive strength (independent of initial compactness) for the same periods the relative deformations of creep are practically equal to each other.
- Kolesnikov A.M. .... 265**  
***Thin-walled tube under radial edge load***  
 This work treats the problem describing the equilibrium of a thin-walled cylindrical non-linearly elastic membrane which is subjected to an outward radial extension applied to one of its ends only. The material of membrane is hyperelastic, isotropic and incompressible. We carefully formulated the geometrically exact equations from the variational principle of minimum potential energy within the framework of nonlinear membrane theory. For Bartenev-Khazanovich and Chernykh-Shubina strain energy functions the solutions were obtained explicitly. It follows from results that these materials have limit value of stretching which depend on the material constants and the initial radius.
- Manukyan G.A., Manukyan Z.K. .... 269**  
***Love Waves in an FGPM Layered Structure***  
 An analytical approach is used to investigate the existence and propagation behavior of surface electro-elastic Love waves in an ideally layered structure consisting of a functionally graded piezoelectric substrate and a dielectric layer. The piezoelectric substrate is polarized in the direction perpendicular to the wave propagation plane and its material parameters change continuously along the thickness direction. The dispersion equations for the existence of surface Love waves with respect to phase velocity are obtained for electrically open and shorted cases, respectively. A detailed investigation of the effects of material gradient on dispersion curve, phase velocity, group velocity, and electromechanical coupling factor is carried out. Numerical results show that material gradient significantly affects the fundamental mode of Love waves but has only negligible effects on the high order modes. Large electromechanical coupling factors could be achieved by an appropriate adjustment of gradient coefficients, which is of practical interest for designing acoustic wave devices.
- Sarkisyan S. V., Melkonyan A.V. .... 273**  
***Three-dimensional problem of Stoneley wave propagation***  
 The question of existence of Stoneley surface wave in a three-dimensional formulation is considered. At the interface between two half-spaces are given conditions for the continuity of two displacements, the normal stress, a shear stress and the restriction of the third displacement. Characteristic equation for the phase speed of surface waves is obtained. The special cases are considered
- Mokryakov V.V. .... 277**  
***Study of the dependence of effective compliances of a plane with an array of round holes on array parameters***

Regular structure materials are used in different technological processes. Therefore, investigation of the mechanical properties of these materials is of considerable practical interest. These mechanical properties are represented by the relationship between average stresses and effective strains, which can be obtained from the solution of the problem for elastic plane. In this paper, we employ the model of an elastic plane having a biaxial periodic system of round holes to analyze the dependence of the effective elastic parameters on the direction of applied loads and the geometrical characteristics of the system. Parameters anisotropy is demonstrated. The abnormally high values of Poisson's ratio, which are impossible in isotropic media but observed in some anisotropic media, are found.

**Oliferuk W., Maj M. ....282**

***Distribution of energy storage rate in area of plastic strain localization during tension***

The presented work is devoted to the new method of energy storage rate determination that allows to obtain distribution of this quantity on the surface of deformed specimen. The method is based on the experimental procedure for simultaneous measurements of temperature, and displacement distributions on the surface of tested specimen during tensile deformation. This procedure involves two complementary imaging techniques: CCD technique and infrared thermography (IRT). It has been shown experimentally that during evolution of plastic strain localization the energy storage rate in some zones of deformed specimen drops to zero and even to negative values. To interpret this result in terms of micro-mechanisms, microstructural observations using electron back scattered diffraction (EBSD) and transmission electron microscopy (TEM) were performed on specimens in different states of deformation.

**Petrov Y.V. ....287**

***Dynamic fracture and pulsed strength of continuum***

Some of the principal features of the behavior of materials subjected to impact actions are common for a number of seemingly quite different physical processes, such as dynamic fracture (starting cracks and spalling), cavitation in liquids, and electrical breakdown in solids. The examples of different physical processes considered in the paper show the fundamental importance of investigating incubation processes preparing abrupt structural changes (fracture, yielding and phase transitions) in continua under intense pulsed actions.

**Piliposyan D.G. ....292**

***Wave propagation in piezoelectric waveguides with periodic interface conditions***

The propagation of electro-magneto-elastic coupled shear waves in a piezoelectric waveguide is considered within a full system of the Maxwell's equations. Two different conditions along the guide walls have been studied in the case of periodic electrically shorted interfaces. It has been shown that under electrically shorted periodic transmission conditions the Bloch-Floquet waves exist only at acoustic frequencies. The results demonstrate the significant effect of piezoelectricity on the widths of band gaps at acoustic frequencies.

**Radchenko P., Goncharov M., Baldin I., Plevkov V., Radchenko A. ....297**

***Influence of strengthening on destruction of reinforced concrete elements of designs at dynamic loading***

This paper present results of experimental and numerical research of reinforced concrete columns and joints at short-term vertical dynamic loading, which have yielded new results of the stressedly-deformed condition and schemes of fracture.

**Sarukhanyan A.A, Varanyan G. G., Mkhitarian L. S. ....302**

***Estimation of hydraulic structures safety by comparison of strength and stability theories***

Hydraulic structures being structures of first class require meeting the safety operation conditions. To secure safety operation conditions of earthfill dams it is important to evaluate their coefficients of stability and strength factor by calculation of mode of deformation of dam body. To complete these calculations the dam body soil actual state observation has to be carried

out by experiments. Based on experimental data the mode of deformation of dam body is revealed by software modeling investigations, and safety operation conditions are evaluated. The mode of deformation is defined by nonlinear equations, which specify elasto-plastic state of dam body soil. Hydraulic structures safety and stability evaluation methods are elaborated in case of dynamic impact.

**Seyranian A.P., Mailybaev A.A..... 306**

***Paradox of Nicolai and similar effects in stability problems***

We present a general approach to the paradox of Nicolai and similar effects analyzed as a singularity of the stability boundary. We study potential systems with arbitrary degrees of freedom and two coincident eigenfrequencies disturbed by small non-conservative positional and damping forces. The instability region is obtained in the form of a cone having a finite discontinuous increase in the general case when arbitrarily small damping is introduced. This is a new destabilization phenomenon, which is similar to the effect of the discontinuous increase of the combination resonance region due to addition of infinitesimal damping. Then we reconsider the paradox of Nicolai: the instability of a uniform axisymmetric elastic column loaded by an axial force and a tangential torque. It is shown that the paradox of Nicolai is related to the conical singularity of the stability boundary which transforms to a hyperboloid with the addition of small dissipation.

**Shekyan L., Verlinski S., Shekyan A., Aidun D., Marzocca P. .... 307**

***Elasto-hydro-dynamic friction of a circular cylinder and of a cylindrical bush with elliptical cross-section***

The framework of elasto-hydro-dynamic lubrication theory [1] is discussed in this paper. The theoretical plane contact problem of a liquid friction rotating about a cylindrical axis with a fixed non-deformable elastic cylindrical bush is presented. An elliptical ring cross-sectional shape is considered for the bush. The particular case of plane contact problem, when the interaction of these bodies is in the boundary lubrication regime was discussed in [2]. The problem is reduced to a closed system of nonlinear integral equations. A complete mathematical analysis of this system is carried out on the principle of contracting mappings developed in [3] and a numerical analysis is used in the design of sliding bearings.

**Sumbatyan M.A., Ciarletta M., Zampoli V., Vaccaro M.....3115**

***Protection of the elastic rectangular structure from seismically generated oscillations by a viscoelastic stratum***

We study the problem about harmonic oscillations of the elastic structure of rectangular shape upon a foundation, in the case when oscillations are caused by a seismic wave arriving from below. The structure is placed on the elastic half-space. In order to protect the structure from the incoming seismic waves, there is applied a special isolation from vibrations by some damping media modeled by a classical viscoelastic material of Kelvin-Voigt type.

**Valesyan S. Sh..... 320**

***Investigation of the influence of ageing on the dissipative properties of getinacks subjected to repeated static loading***

The effect of ageing on the dissipative properties of getinacks subjected to repeated static loading has been investigated. Specimens were tested at the age of 1, 4, and 8 years. The approximation of experimental data is done, and the energy of dissipation is calculated. The hysteresis characteristics have been obtained at the values of strength close to the values of its ultimate strength. Based on the investigation of getinacks manufactured by the technology of regulated thermo-pressing, this technology can be recommended for the manufacturing of appropriate products.

**Vashakmadze T. S. , Gvinchidze G. I. .... 323**

***To survey of some results from Zavriev in the viscous-elasticity***

In the first part we give the generalized form for kernels when the mathematical models for elasto-creeping materials are linear and homogeneous. The foundations of these results are some achievements gathered by groups of engineers and mathematicians from Zavriev Institute of SM & EE and Vekua IAM in the period 1968-2005 from great influences of Arutiunian's heritage. In the second part we present the method of constructing 2Dim with respect to spatial coordinates nonlinear dynamical for a mathematical models of von Kármán -Reissner-Mindlin type for viscous -elastic thin-walled structures and corresponding governing relations without any simplify hypothesis of mechanical or geometrical meanings and Volterra's principle.

**Yakushev V.L. ....328**

***The problem of intraocular pressure measurement modeling by a pneumotometric method***

The procedure of measuring the intraocular pressure by an optical analyzer is numerically simulated. The cornea and the sclera are considered as axisymmetrically deformable shells of revolution with fixed boundaries; the space between these shells is filled with incompressible fluid. Nonlinear shell theory is used to describe the stressed and strained state of the cornea and sclera. The optical system is calculated from the viewpoint of the geometrical optics. Dependences between the pressure in the air jet and the area of the surface reflecting the light into a photodetector are obtained. The shapes of the regions on the cornea surface are found from which the reflected light falls on the photodetector. First, the light is reflected from the center of the cornea, but then, as the cornea deforms, the light is reflected from its periphery. The numerical results make it possible to better interpret the measurement data. Two types of boundary conditions are compared; for each of them, the relation between the pressure in the air jet and the area of the surface from which the reflected light is recorded by the photodetector is analyzed.